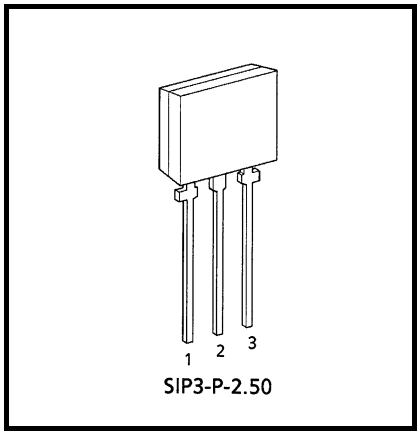
TOSHIBA Intelligent Power Device Silicon Monolithic Power MOS Integrated Circuit

TPD1024AS

Low-side Power Switch for Motors, Solenoids, and Lamp Drivers

The TPD1024AS is a monolithic power IC for low-side switches. The IC has a vertical MOS FET output which can be directly driven from a CMOS or TTL logic circuit (e.g., an MPU). The device is equipped with an intelligent self-protection function.

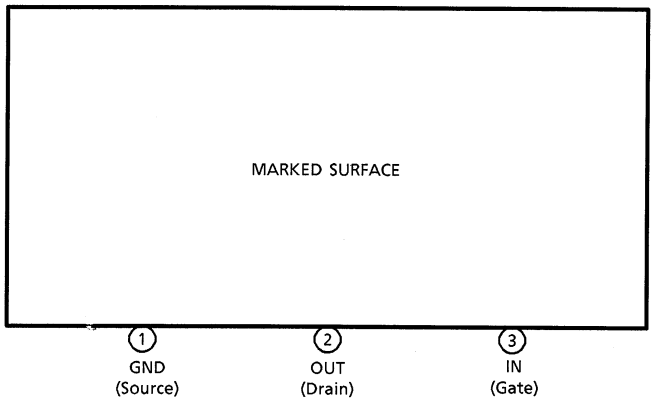


Weight: 0.54g (typ.)

Features

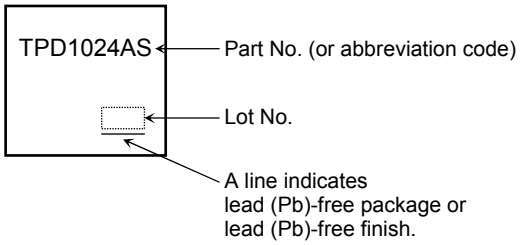
- A monolithic power IC with a new structure combining a control block and a vertical power MOS FET (π-MOS) on a single chip
- Can directly drive a power load from a CMOS logic.
- Built-in protection against overvoltage, load short-circuiting, and thermal shutdown
- Low on-resistance : $R_{DS\ (ON)}$ = 0.5 Ω (max) (@V_{IN} = 5 V, T_j = 25°C)
- Package : TPS that can be packed in tape.

Pin Assignment

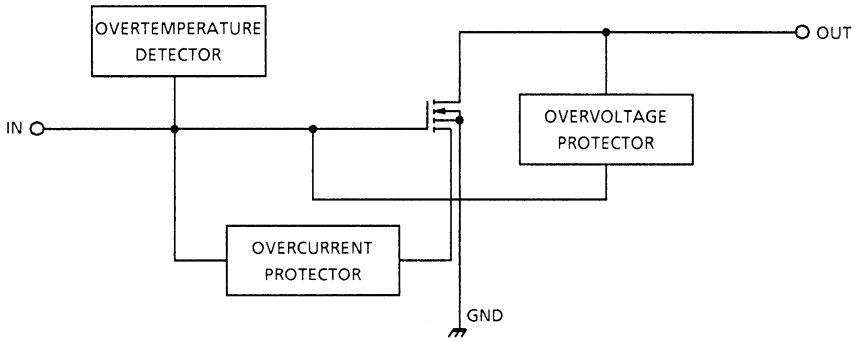


Note: Due to its MOS structure, this product is sensitive to static electricity.

Marking



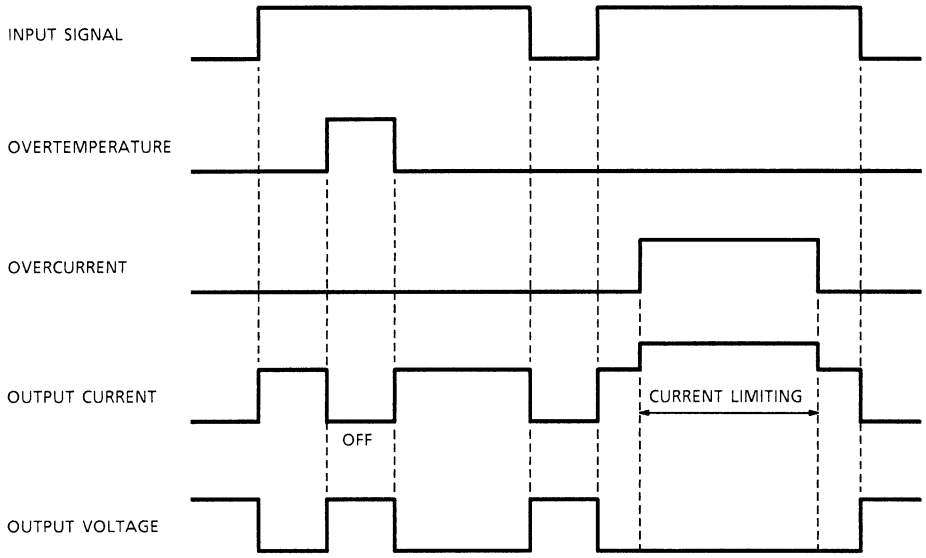
Block Diagram



Pin Description

Pin No.	Symbol	Function
1	GND	Ground pin.
2	OUT	Output pin. When current in excess of the typical current (3.5 A (typ.)) flows to the output pin, the current limiter operates to protect the IC.
3	IN	Input pin. Input is CMOS-compatible, with pull-down resistor connected. Even if the input is open, output will not accidentally turn on.

Timing Chart



Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Drain-source voltage	$V_{DS\ (DC)}$	40	V
Output current	I_D	1.5	A
Input voltage	V_{GS}	− 0.5 to 6	V
Power dissipation	P_D	1.2	W
Operating temperature	T_{opr}	− 40 to 85	°C
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	− 55 to 150	°C

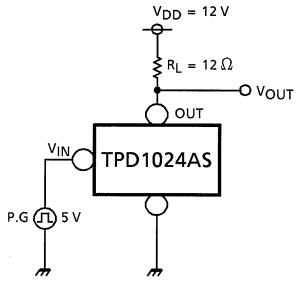
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

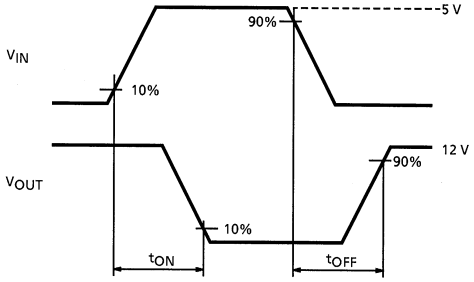
Electrical Characteristics (Tj = 25°C)

Characteristic	Symbol	Test Cir-cuit	Test Condition	Min	Typ.	Max	Unit
Drain-source breakdown voltage	$V_{(BR)\ DSS}$	—	V_{GS} = 0, I_D = 10 mA	40	—	—	V
Operating supply voltage	$V_{DD\ (OPR)}$	—	—	—	—	18	V
Current at output off	$I_{DSS\ (1)}$	—	V_{GS} = 0, V_{DS} = 40 V	—	—	3	mA
	$I_{DSS\ (2)}$	—	V_{GS} = 0, V_{DS} = 24 V	—	—	100	μA
Input threshold voltage	V_{th}	—	V_{GS} = 10 V, I_D = 1 mA	0.8	—	2.5	V
Input current	I_{GSS}	—	V_{GS} = 5 V, at normal operation	—	—	300	μA
On-resistance	$R_{DS\ (ON)}$	—	V_{GS} = 5 V, I_D = 1 A	—	—	0.5	Ω
Thermal shutdown temperature	T_S	—	—	—	160	—	°C
Overcurrent protection	I_S	—	V_{DS} = 12 V, V_{GS} = 5 V	—	3.5	—	A
Switching time	t_{ON}	1	V_{DS} = 12 V, V_{GS} = 5 V, R_L = 12 Ω	—	50	—	μs
	t_{OFF}			—	10	—	μs
Diode forward voltage between drain and source	V_{DSF}	—	I_F = 1.5 A	—	0.9	1.8	V
Avalanche energy	E_A	—	L = 10 mH, Single pulse	30	—	—	mJ

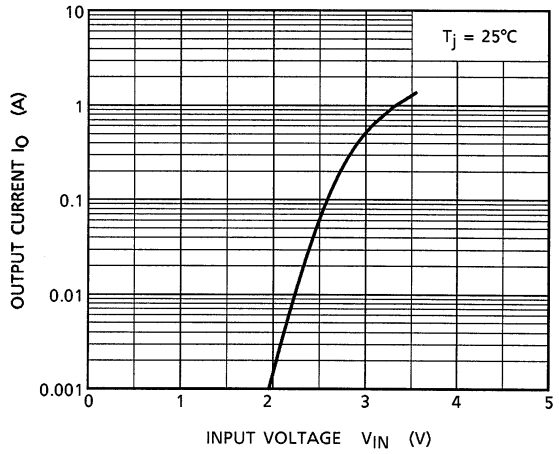
Test Circuit 1

Switching Time

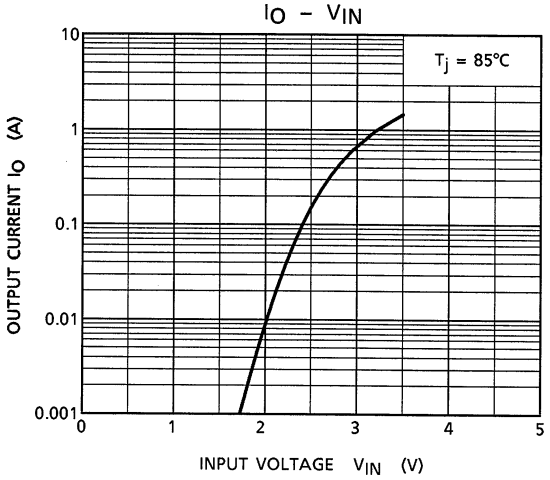




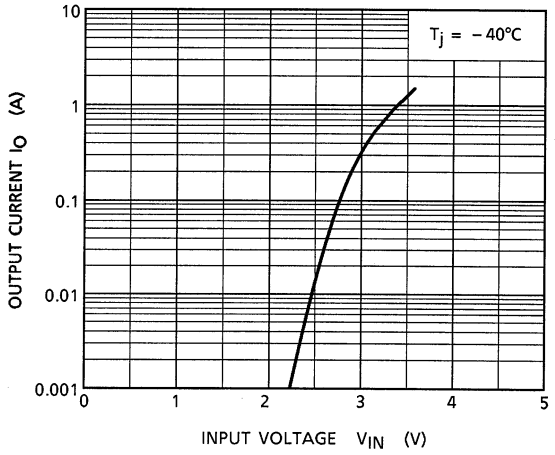
I_O – V_{IN}



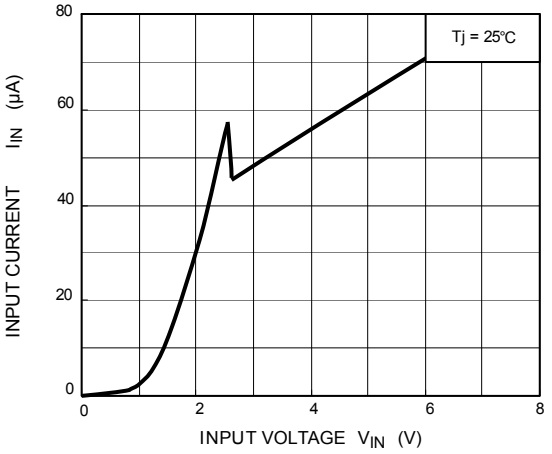
I_O – V_{IN}



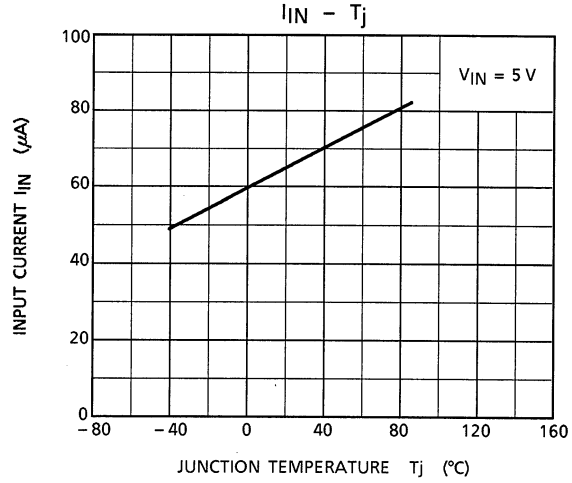
I_O – V_{IN}



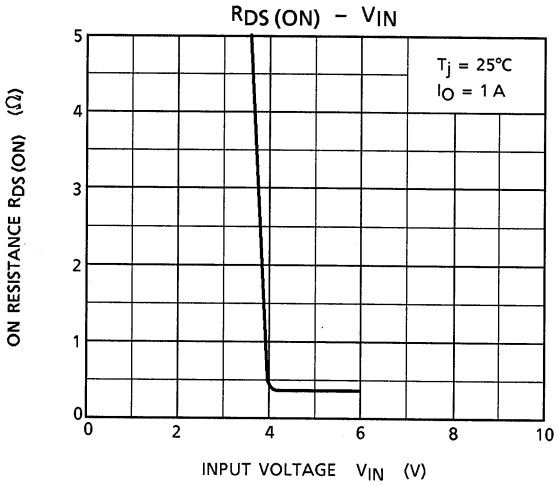
I_{IN} - V_{IN}



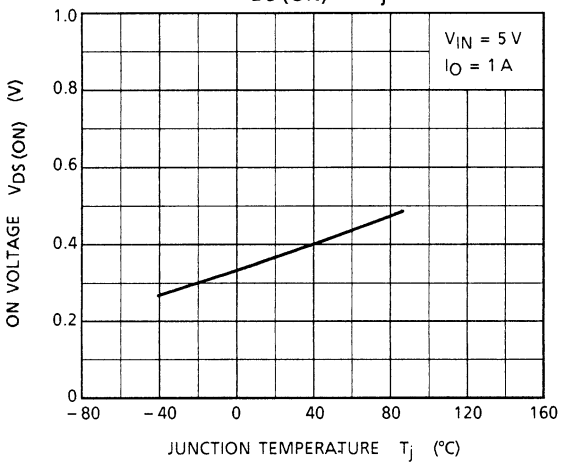
I_{IN} – T_j



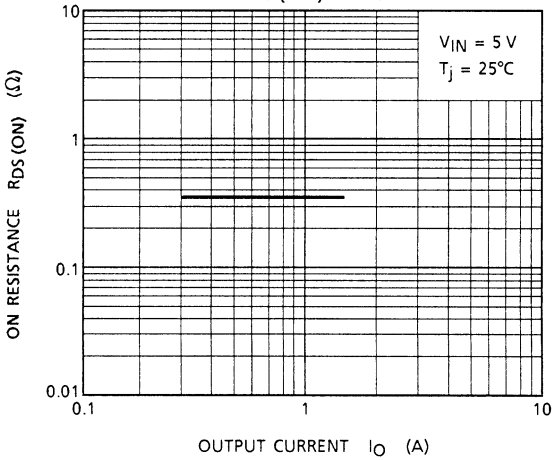
$R_{DS\,(ON)}$ – V_{IN}



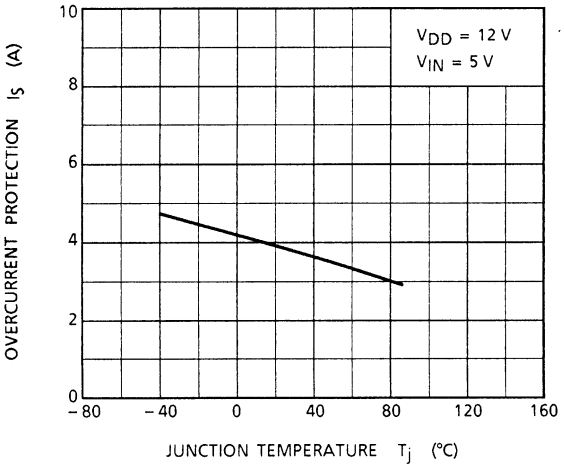
$V_{DS\,(ON)}$ – T_j



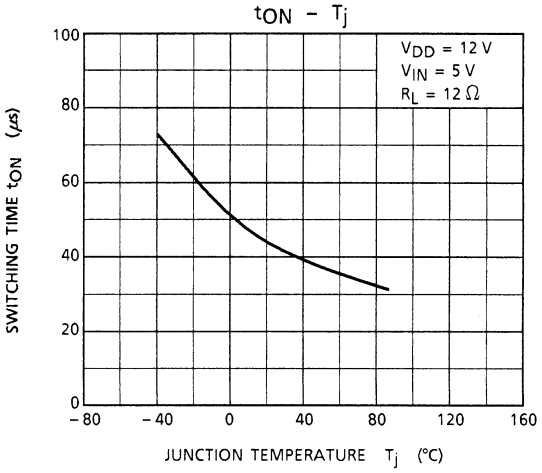
$R_{DS\,(ON)}$ – I_O



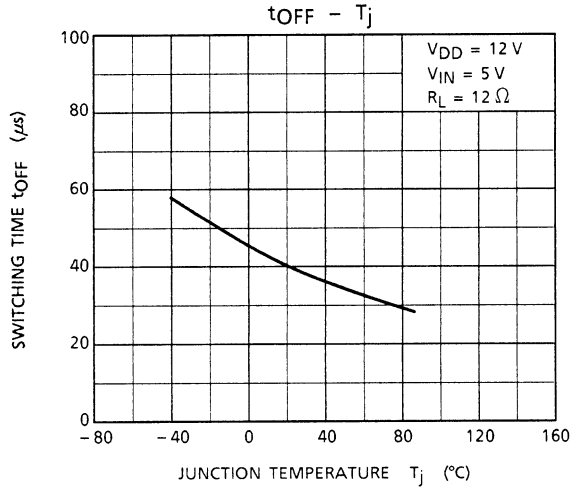
I_S – T_j



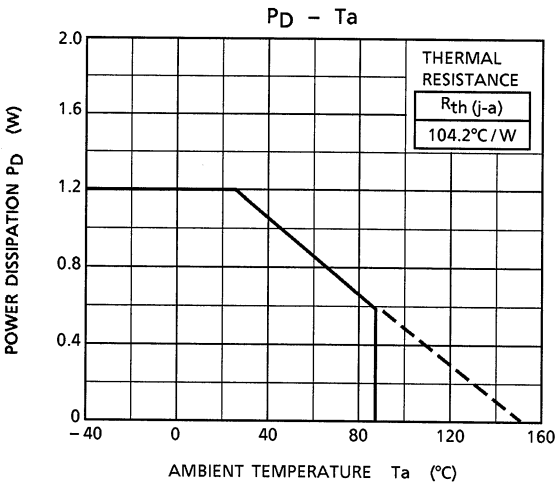
t_{ON} – T_j



t_{OFF} – T_j

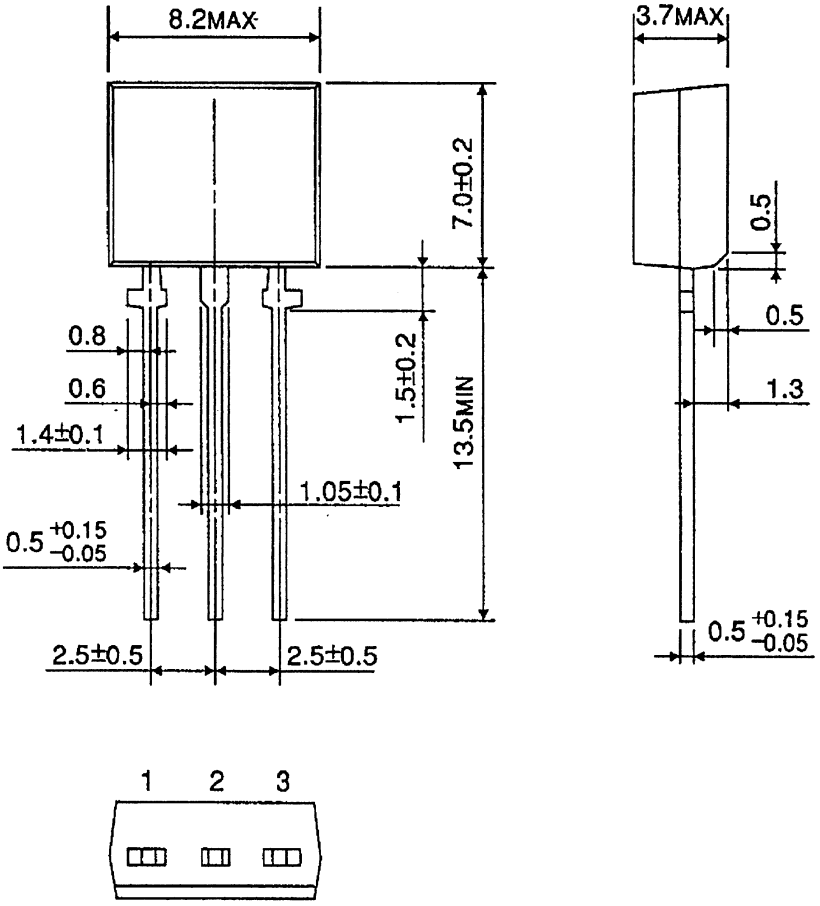


P_D – Ta



Package Dimensions

SIP3-P-2.50 Unit : mm



Weight: 0.54g (typ.)

RESTRICTIONS ON PRODUCT USE

20070701-EN

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